

Phyllomyza Fallén (Diptera: Milichiidae) from Yunnan with description of four new species

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Abstract: The following four species in the genus *Phyllomyza* Fallén from Yunnan Province are described as new to science: *Phyllomyza aureolusa* sp. nov., *Phyllomyza basilatula* sp. nov., *Phyllomyza fuscusa* sp. nov. and *Phyllomyza leioipalpa* sp. nov. A key to the known species of *Phyllomyza* from China is presented.

Key words: Cyclorrhapha; Carnoidea; taxonomy; key

云南真叶蝇属四新种（双翅目：叶蝇科）

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摘要：记述中国云南真叶蝇属4新种：金黄真叶蝇 *P. aureolusa* sp. nov.，宽基真叶蝇 *P. basilatula* sp. nov.，棕真叶蝇 *P. fuscusa* sp. nov.，平须真叶蝇 *P. leioipalpa* sp. nov.。提供了该属中国所有种类的检索表。

关键词：环裂亚目；鸟蝇总科；分类；检索表

Introduction

Phyllomyza Fallén, 1810 belongs to the subfamily Phyllomyzinae of the family Milichiidae. Most species are characterized by the following characteristics: 3 laterocline orbital setae; occiput not strongly concave in dorsal view; palpus and the first flagellomere in male usually greatly enlarged, longer than broad; lunule usually with a pair of setae (Brake 2000). *Phyllomyza* is distributed globally with exception of the Neotropical Region (Malloch 1914a; Hennig 1937, 1967; Papp 1976, 1984; Papp & Wheeler 1998; Yang 1998; Brake 2000; Iwasa 2003; Xi & Yang 2013, 2015a, b). Adults are often collected more commonly than larvae. Sweep nets and Malaise traps have been the most successful collection methods.

The Chinese species are reviewed with 16 known species, of which 4 species were distributed in Taiwan (Hendel 1914; Malloch 1914b; Yang 1998; Xi & Yang 2013, 2015a, b). In the present paper, 4 species of this genus from Yunnan are described as new to science. A key to the known species of the *Phyllomyza* from China is presented.

Material and methods

Terms used for adult structures follow those of McAlpine (1981) and Brake (2000). The following abbreviations are used: asc—apical scutellar seta(e), bsc—basal scutellar seta(e), dc—dorsocentral seta(e), h—humeral seta(e), ia—intraalar seta(e), kepsts—katepisternal seta(e), npl—notopleural seta(e), pa—postalar seta(e), pos—postsutural seta(e), ppl—propleura seta(e), prs—presutural seta(e), prsc—prescutellar seta(e), sa—supraalar seta(e), S—sternite, and T—tergite.

The type specimens are deposited in the Entomological Museum of China Agricultural University, Beijing (CAU).

Taxonomy

Key to species of *Phyllomyza* from China (males)

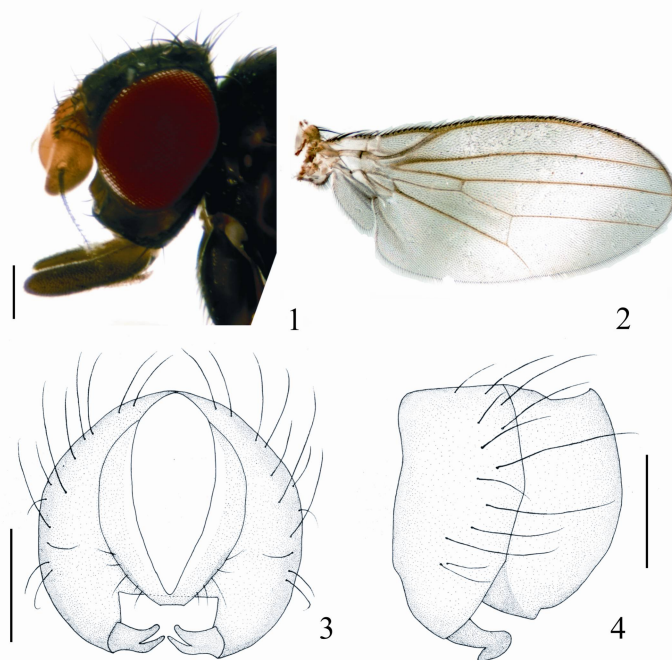
1. Palpus almost bare, without setulae.....2
- Palpus with short setulae at tip and on ventral side..... 5
2. Frons with 3 orbital setae; ocellar triangle brownish..... *P. fuscusa* **sp. nov.**
- Frons with 4 orbital setae; ocellar triangle blackish brown..... 3
3. Cercus with short ventral appendix; arista 2.5 times as long as first flagellomere..... *P. nudipalpis* Malloch
- Cercus lacking ventral appendix; arista 3 times as long as first flagellomere.....4
4. Palpus slightly longer, about 0.6 mm; first flagellomere irregularly subsquare, 2 times wider than long.....
- *P. leioipalpa* **sp. nov.**
- Palpus length 0.4 mm; first flagellomere almost the same length and width..... *P. aureolusa* **sp. nov.**
5. Palpus slightly longer, at least 0.6 mm long.....6
- Palpus length less than 0.6 mm..... 7
6. First flagellomere irregularly trapezoidal; knob of halter yellowish white..... *P. basilatula* **sp. nov.**
- First flagellomere irregularly rectangular; knob of halter darkish brown..... *P. sinensis* Xi & Yang
7. Halter orange brown; cercus with ventral appendix..... *P. epitacta* Hendel
- Halter yellowish white; cercus lacking ventral appendix.....8
8. Palpus length 0.2 mm, pointed apically; first flagellomere hammer-shaped..... *P. claviconis* Yang
- Palpus inflated, blunted apically; first flagellomere approximately circular..... 9
9. M_1 between r-m and dm-cu as long as dm-cu..... 10
- M_1 between r-m and dm-cu longer than dm-cu..... 11
10. Gena narrow, approximately one-eleventh eye height; palpus long, 5 times as long as wide.....
- *P. angustigenis* Xi & Yang
- Gena relatively broad, approximately one-seventh eye height; palpus long, 7 times as long as wide.....
- *P. euthyipalpis* Xi & Yang
11. M_1 between r-m and dm-cu at least 1.5 times longer than dm-cu..... 12
- M_1 between r-m and dm-cu less than 1.2 times longer than dm-cu..... 16
12. Vibrissa located at level of lower eye margin..... 13
- Vibrissa located below level of lower eye margin..... 14
13. Palpus yellow, protruding, but not much broadened; hind tibia yellowish..... *P. luteipalpa* Malloch
- Palpus dark brown, thick, slightly broad; hind tibia yellow to brown..... *P. clavellata* Xi & Yang
14. Halter white; palpus sickle-shaped..... *P. drepanipalpis* Xi & Yang
- Halter dark brown or yellowish; palpus slightly flat and straight..... 15

15. Gena approximately one-seventh eye height; knob of halter yellowish..... *P. emeishanensis* Xi & Yang
 -. Gena approximately one-fifth eye height; knob of halter with upper half white and lower half dark brown.....
 *P. latustigenis* Xi & Yang
16. First flagellomere irregularly circular..... 17
 -. First flagellomere irregularly trapezoidal..... *P. dicrana* Xi & Yang
17. Vibrissal angle relatively acute, its tip less than a 60 degree angle..... *P. cuspidigera* Xi & Yang
 -. Vibrissal angle flat and blunt..... 18
18. Cercus with thin ventral appendix; hind tibia brownish..... *P. dilatata* Malloch
 -. Cercus lacking short ventral appendix; hind tibia dark brown..... 19
19. Palpus wide, knife-shaped, 2.6 times longer than wide; knob of halter with upper half brownish and lower half dark brown..... *P. planipalpis* Xi & Yang
 -. Palpus basally wide and apically narrowed; knob of halter with upper half yellow and under half yellowish.....
 *P. tibetensis* Xi & Yang

1. *Phyllomyza aureolusa* sp. nov. (Figs. 1–4)

Diagnosis. Gena approximately one-sixth eye height. Surstylus with upper blade of bifurcated tip slightly swollen and lower one thin.

Body length 2.0 mm; wing length 1.8 mm.



Figures 1–4. *Phyllomyza aureolusa* sp. nov., ♂. 1. Head, lateral view; 2. Wing; 3. Epandrium, cerci, and surstyli, posterior view; 4. Epandrium, cerci, and surstyli, lateral view. Scale bars = 0.1 mm.

Male. Head (Fig. 1) darkish brown with grayish microtomentum. Orbital plate subshiny blackish brown with microtomentum, ocellar triangle blackish brown without microtomentum; lunule strap-shaped, darkish yellow. Posterior eye margin ventrally diverging from head margin, eye 1.5 times as high as long, gena approximately one-sixth eye height. Setae and

setulae on head black; ocellar triangle with 2 long ocellar setae and 3 short setae; frons with 3 orbital and 2 frontal setae on blackish brown orbital stripe, orbital setae laterocline and frontal setae mediocline, 4 interfrontal setae; postocellar setae converging. Lunule with 2 setae. Vibrissal angle relatively blunt, approximately right-angle; vibrissa strong and located below level of lower eye margin. Antenna yellow with microtomentum; pedicel with short black setae at middle and margin, longest one about 4 times longer than others; first flagellomere with pubescence, almost the same length and width; arista blackish brown, distinctly dense pubescence, 3 times as long as first flagellomere. Proboscis short, brownish, with sparse black setulae. Palpus slightly longer, flat and straight, about 0.4 mm, 4.5 times longer than wide; brownish with short dense black setulae, margin with short sparse setae.

Thorax brown with grey microtomentum, except mesonotum shiny brown with sparse black microtomentum; scutellum darkish brown with gray microtomentum. Setae and setulae on thorax black; 1 h, 2 dc, 1 prsc, 2 npl, 1 prs, 1 pos, 1 sa, 1 pa, 1 kepsts (setulae at forward position); scutellum 1.3 times wider than long, with pair of asc and bsc, asc 3 times longer than bsc. Legs slender, coxae and femora darkish brown, tibiae yellowish except hind tibia yellowish brown, tarsi yellowish. Setae and setulae on legs black. Mid tibia with 1 black preapical dorsal seta. Wing (Fig. 2) hyaline; veins brown; Sc strong; M_1 between r-m and dm-cu longer than dm-cu. Calypter yellowish, with dense brownish microtrichae, margin with brownish setulae. Knob of halter yellowish white, stalk yellowish.

Abdomen brown with gray microtomentum. Setae and setulae on abdomen black; T2–T5 with setae at posterior 3/4, marginal setae longer than others; sternites with sparse black setulae. Posteromedial triangular projection of T1 into T2 weak; S2 irregularly horseshoe-shaped, S3 irregularly subquadrate, S4 horizontally rectangular; S5 generally strap-shaped. Male genitalia (Figs. 3, 4): epandrium with 12 pairs of strong setae at middle; surstylus with upper blade of bifurcated tip slightly swollen and lower one thin; cercus arched and with short sparse setae.

Female. Unknown.

Etymology. The specific epithet refers to the colour of antenna being golden.

Holotype. ♂, China, Yunnan, Lvchun, Qimaba, 772 m, 22.81°N, 102.24°E, 09-VI-2013, Jinying YANG. **Paratype.** 1♂, same data as holotype.

Distribution. China (Yunnan).

Remarks. This new species is distinctly different from other species of the genus in the palpus flat and straight; antenna is golden and eye is reddish.

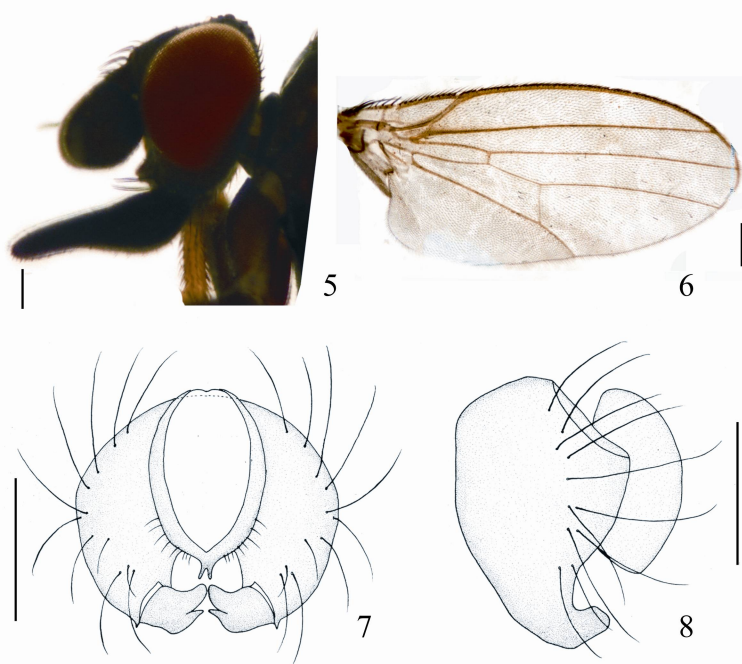
2. *Phyllomyza basilatula* sp. nov. (Figs. 5–8)

Diagnosis. Palpus relatively long, base wide and enlarged, apex gradually narrowed, about 0.6 mm; surstylus with upper blade of bifurcated tip extremely swollen and lower one slightly sharp.

Body length 1.8 mm; wing length 2.0 mm.

Male. Head (Fig. 5) black with grayish microtomentum. Orbital plate subshiny black with microtomentum, ocellar triangle blackish brown without microtomentum; lunule strap-shaped, darkish brown with black margin. Posterior eye margin ventrally diverging from head margin, eye 1.5 times as high as long, gena approximately one-sixth eye height. Setae and setulae on head black; ocellar triangle with 2 long ocellar setae and 3 short setae; frons with 3 orbital and

2 frontal setae on blackish brown orbital stripe, orbital setae laterocline and frontal setae mediocline, 4 interfrontal setae; postocellar setae cruciate. Lunule with 2 setae. Vibrissal angle relatively blunt, vibrissa strong and located at level of lower eye margin. Antenna blackish brown with brownish microtomentum; pedicel with black setulae at middle and margin, setulae at margin longer than others, longest one about 3 times longer than the others; first flagellomere with pubescence, irregularly trapezoidal; arista darkish brown, with short pubescence, 3.5 times as long as first flagellomere. Proboscis folded, darkish brown with sparse setulae. Palpus relatively long, basal wide and enlarged, apical gradually narrowed in lateral view, about 0.6 mm, 1.8 times longer than wide at base; black with short dense black pubescence, margin without obviously short sparse setulae.



Figures 5–8. *Phyllomyza basilatosa* sp. nov., ♂. 5. Head, lateral view; 6. Wing; 7. Epandrium, cerci, and surstyli, posterior view; 8. Epandrium, cerci, and surstyli, lateral view. Scale bars = 0.1 mm.

Thorax darkish brown with grey microtomentum, except mesonotum shiny darkish brown; scutellum darkish brown with gray microtomentum. Setae and setulae on thorax black; 1 h, 2 dc, 1 prsc, 2 npl, 1 prs, 1 pos, 1 ia, 1 sa, 2 pa, 1 kepsts (a row setulae at forward position); scutellum 1.5 times wider than long, with pair of asc and bsc, asc 3 times longer than bsc. Legs slender, coxae and femora darkish brown, tibiae darkish yellow, tarsi yellowish. Setae and setulae on legs black. Mid tibia with 1 black preapical dorsal seta. Wing (Fig. 6) hyaline; veins brown; Sc strong; M_1 between r-m and dm-cu longer than dm-cu. Calypter yellowish, with dense brownish microtrichae and margin with brownish setulae. Knob of halter yellowish white.

Abdomen darkish brown with gray microtomentum. Setae and setulae on abdomen black; T2–T5 with setae at posterior 3/4, marginal setae longer than others; sternites with sparse

setulae. Posteromedial triangular projection of T1 into T2 strong; S2 generally horseshoe-shaped, S3 vertically rectangular, S4 vertically trapezoidal, the apical margin a little longer than the basal margin, S5 generally horizontally trapezoidal, 2.5 times longer than wide. Male genitalia (Figs. 7, 8). Upper epandrium extremely circular; epandrium with 11 pairs of strong setae at middle; surstylus with upper blade of bifurcated tip extremely swollen and lower one slightly sharp; cercus arched and with short sparse setae.

Female. Unknown.

Etymology. The specific epithet refers to the base of palpus being extremely wide.

Holotype. ♂, **China**, Yunnan, Yingjing, Xima, 1680 m, 24.76°N, 97.70°E, 04-V-2012, Yuanye LIU. **Paratypes.** 1♂, same data as holotype, Wenliang LI; 5♂, same locality as holotype, Wenliang LI.

Distribution. China (Yunnan).

Remarks. This new species is distinctly different from other species of this genus in the palpus being extremely developed and base very wide; epandrium with 11 pairs of strong setae.

3. *Phyllomyza fuscusa* sp. nov. (Figs. 9–12)

Diagnosis. Gena approximately one-ninth of eye height. Surstylus darker than epandrium, the apical margin flat and blunt.

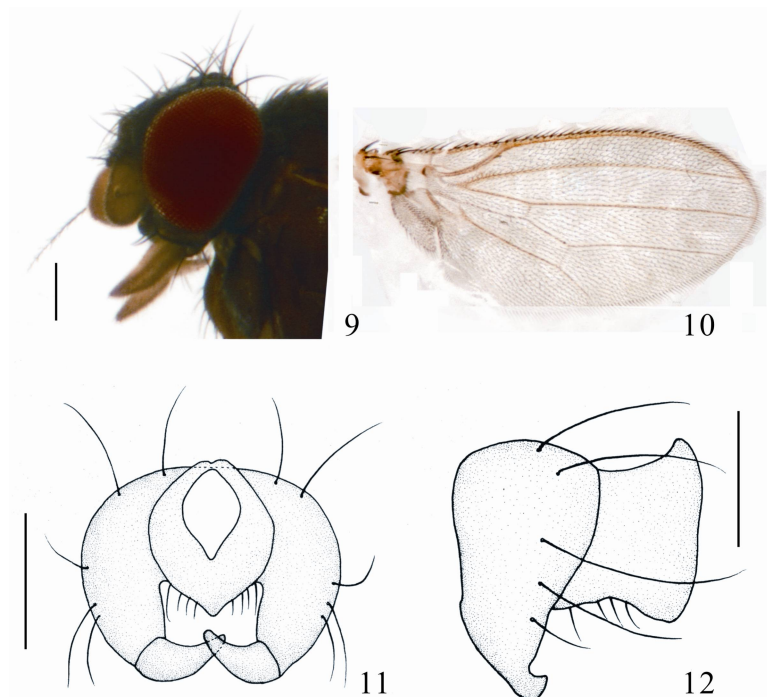
Body length 1.2–1.3 mm; wing length 1.1–1.3 mm.

Male. Head (Fig. 9) black with grayish microtomentum. Orbital plate subshiny black with microtomentum, ocellar triangle brownish without microtomentum; lunule strap-shaped, darkish brown with black margin. Posterior eye margin ventrally diverging from head margin, eye 1.4 times as high as long, gena approximately one-ninth eye height. Setae and setulae on head black; ocellar triangle with 2 long ocellar setae and 3 short setae; frons with 3 orbital and 2 frontal setae on brownish orbital stripe, orbital setae laterocline and frontal setae mediocline, 3 interfrontal setae; postocellar setae cruciate. Lunule with 2 setae. Vibrissal angle relatively flat, vibrissa strong and located at level of lower eye margin. Antenna blackish brown except first flagellomere darkish yellow, with brownish microtomentum; pedicel with short black setae at middle and margin, longest one about 4 times longer than others; first flagellomere with pubescence, irregularly subsquare; arista darkish brown, distinctly pubescent, 3.5 times as long as first flagellomere. Proboscis folded, apical half darkish yellow and the rest brown, with short sparse black setulae. Palpus darkish yellow, wide and flat, with short dense black setulae, margin with short sparse black setae.

Thorax yellowish brown with grey microtomentum, except mesonotum shiny blackish brown with sparse black microtomentum; scutellum yellowish brown with gray microtomentum. Setae and setulae on thorax black; 1 h, 2 dc, 1 prsc, 2 npl, 1 prs, 1 sa, 2 pa, 1 kepsts (setulae at forward position); scutellum 1.5 times wider than long, with pair of asc and bsc, asc 3.5 times longer than bsc. Legs slender, coxae and femora brownish, tibiae yellowish except hind tibia brownish at middle, tarsi yellowish. Setae and setulae on legs black. Mid tibia with 1 black preapical dorsal seta. Wing (Fig. 10) hyaline; veins brown; Sc strong; M₁ between r-m and dm-cu much longer than dm-cu. Calypter yellowish, with dense brownish microtrichae and margin with brownish setulae. Knob of halter brownish, stalk brown.

Abdomen brownish yellow with gray microtomentum. Setae and setulae on abdomen

black; T2–T5 with setae at posterior 3/4, marginal setae longer than others; sternites with sparse setulae. Posteromedial triangular projection of T1 into T2 strong; S2 approximately horizontally small oval-shaped, S3 and S4 generally trapezoidal, the apical margin a little longer than the basal margin, S4 a little larger than S3; S5 horizontally rectangular, 4 times longer than wide. Male genitalia (Figs. 11, 12): epandrium with 5 pairs of strong setae at middle; surstylus darker than epandrium, the apical margin flat and blunt; cercus arched and with short sparse setae.



Figures 9–12. *Phyllomyza fuscusa* sp. nov., ♂. 9. Head, lateral view; 10. Wing; 11. Epandrium, cerci, and surstyli, posterior view; 12. Epandrium, cerci, and surstyli, lateral view. Scale bars = 0.1 mm.

Female. Body length 1.2–1.4 mm; wing length 1.2–1.4 mm.

Similar to male. Female terminalia: T8 brown yellow, margin with setulae; T9 irregularly pentagonal, the base slightly square, the apex slightly extended, triangular. S9 slightly trapezoidal. Cercus irregularly oval-shaped, margin with sparse setulae.

Etymology. The specific epithet refers to the body colour being brown.

Holotype. ♂, **China**, Yunnan, Lvchun, Huanglianshan, 2000 m, 22.89°N, 102.30°E, 20-VII-2013, Feiyang LIANG. **Paratypes.** 2♀, Yunnan, Lvchun, Qimaba, 770 m, 22.81°N, 102.24°E, 05-VI-2013, Jinying YANG.

Distribution. China (Yunnan).

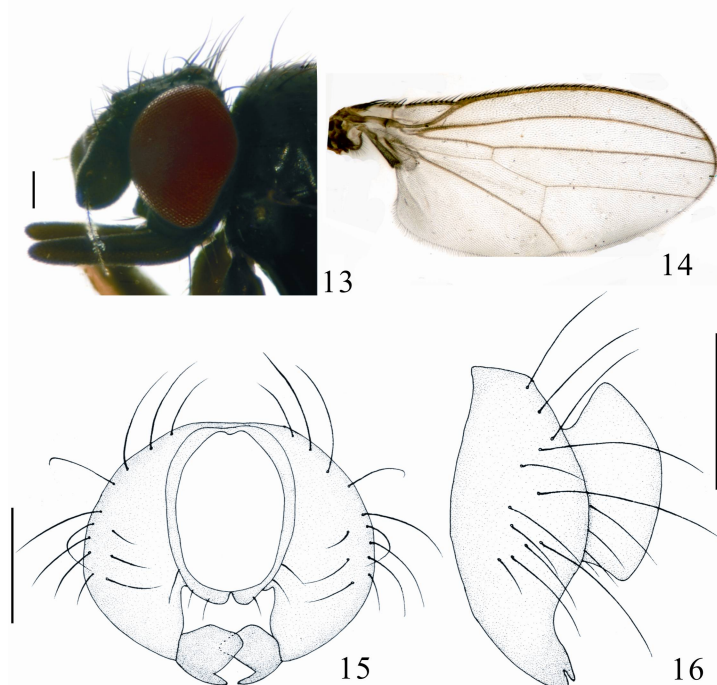
Remarks. This new species is somewhat similar to *P. luteipalpis* Malloch from Taiwan but the mesonotum shiny blackish brown; knob of halter brownish, stalk brown; hind tibia brownish at middle and yellowish both ends. In *P. luteipalpis*, the mesonotum is shiny brownish; the knob of halter is white, stalk is yellowish; the hind tibia is yellowish (Malloch 1914a).

4. *Phyllomyza leioipalpa* sp. nov. (Figs. 13–16)

Diagnosis. Gena approximately one-tenth eye height. Surstylus with upper blade of bifurcation extremely swollen, short and apical blunt, the lower one slightly swollen and shorter than upper one.

Body length 1.7 mm; wing length 1.9 mm.

Male. Head (Fig. 13) brown with black microtomentum; orbital plate subshiny brown with microtomentum, ocellar triangle blackish brown without microtomentum; lunule strap-shaped, blackish brown with black margin. Posterior eye margin ventrally diverging from head margin; eye 1.3 times as high as long, gena approximately one-tenth eye height. Setae and setulae on head black; ocellar triangle with 2 ocellar setae and 3 short setae; frons with 3 orbital and 2 frontal setae on darkish brown orbital stripe without microtomentum, orbital setae laterocline and frontal setae mediocline, 4 interfrontal setae; postocellar setae cruciate. Lunule with 2 setae. Vibrissal angle relatively blunt; vibrissa strong, located at the level of lower eye margin. Antenna darkish brown with microtomentum; pedicel with short black setulae at middle and margin, setulae at margin longer than others, longest one about 3.5 times longer than others; first flagellomere with pubescence, irregularly subsquare, 2 times wider than long; arista 3 times as long as first flagellomere, black, distinctly pubescent. Proboscis slightly short and folded, brownish, margin with sparse setulae. Palpus slightly longer, with blunt tip in lateral view, about 0.6 mm, base to apex inconspicuously narrowing; darkish brown with short dense black pubescence, margin with sparse short setulae.



Figures 13–16. *Phyllomyza leioipalpa* sp. nov., ♂. 13. Head, lateral view; 14. Wing; 15. Epandrium, cerci, and surstyli, posterior view; 16. Epandrium, cerci, and surstyli, lateral view. Scale bars = 0.1 mm.

Thorax darkish brown with grey microtomentum, except mesonotum shiny brownish with sparse black microtomentum; scutellum darkish brown with gray microtomentum. Setae and setulae on thorax black; 1 h, 4 dc, 1 prsc, 2 npl, 1 prs, 1 pos, 1 sa, 2 pa, 1 kepsts (setulae at forward position); scutellum 2 times wider than long, with pair of asc and bsc, asc 3 times longer than bsc. Legs slender, coxae and femora darkish brown, tibiae brownish yellow except fore tibia yellow, tarsi yellowish. Setae and setulae on legs black. Mid tibia with 1 black preapical dorsal seta. Wing (Fig. 14) hyaline, unspotted; veins brown; Sc strong; M_1 between r-m and dm-cu longer than dm-cu. Calypter yellowish, with dense brownish microtrichae, margin with thin and long setulae. Knob of halter yellowish white, stalk yellowish.

Abdomen brown with gray microtomentum. Setae and setulae on abdomen black; T2-T5 with setae, marginal setae longer than others; sternites with sparse black setulae at posterior 3/4. Posteromedial triangular projection of T1 into T2 weak; S2 irregularly trapezoidal-shaped, but the apical margin shorter than basal margin, S3 vertically rectangular, S4 irregularly trapezoidal-shaped and the apical margin slightly longer than basal margin, S5 slightly saddle-shaped. Male genitalia (Figs. 15, 16): epandrium with 12 pairs of strong black setae at middle; surstylus with upper blade of bifurcation extremely swollen, short and apical blunted, the lower one slightly swollen and shorter than upper one; cercus arched with short sparse setae.

Female. Unknown.

Etymology. The specific epithet refers to the palpus being flat and straight.

Holotype. ♂, China, Yunnan, Lvchun, Qimaba, 772 m, 22.81°N, 102.24°E, 07-VI-2013, Jinying YANG. **Paratypes.** 1♂, Yunnan, Yingjing, Xima, 1680 m, 24.76°N, 97.70°E, 05-V-2012, Wenliang LI; 1♂, Yunnan, Baoshan, Jietou, 1740 m, 25.63°N, 98.80°E, 08-V-2012, Wenliang LI; 1♂, Yunnan, Baoshan, Jietou, 1740 m, 25.63°N, 98.80°E, 08-V-2012, Yuanye LIU.

Distribution. China (Yunnan).

Remarks. This species is similar to *P. sinensis* Xi & Yang, but can be separated easily from the latter by the frons having 4 interfrontal setae; 4 dc; knob of halter yellowish white. In *P. sinensis* the frons has 3 interfrontal setae; 3 dc; the knob of halter is darkish brown (Xi & Yang 2015b).

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